

The Environmental Occurrence, Fate, and Ecotoxicity of Prozac[®], Paxil[®], Zoloft[®], Celexa[®], and Luvox[®] in Aquatic Environments

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In the United States, human health pharmaceuticals are heavily prescribed. For example, in 1999 over 2.8 billion prescriptions were issued by physicians. Given a population in the U.S. estimated at 270 million individuals, this would be approximately 10 prescriptions issued for every man, woman, and child in the country. Indeed the amounts of some the most heavily prescribed drugs approach that of pesticides used to protect agricultural crops. Most of these preparations are excreted via urine or feces into the sanitary sewer system and subsequently pass through wastewater treatment facilities. It appears that not all water treatment facilities have processes that are adequate to remove pharmaceuticals from wastewater. Data from the European Union has shown that many pharmaceuticals are commonly detected in surface waters receiving sewage treatment plant effluent. Unlike pesticides, only limited testing is conducted to determine how persistent these chemicals are in the environment and what impacts they may have on organisms in streams receiving wastewater effluent.

EPA STAR Drinking Water (2000) - (R829006). For each drug, laboratory environmental fate and ecotoxicity measurements will be conducted in a manner similar to those tests required for pesticide registration following EPA protocols wherever possible. Organisms tested will include water fleas, mosquito fish, and frogs. Additionally, the occurrence of each drug will be measured in raw and treated wastewater and receiving water at sub-ppb levels. This approach will allow exposure and risk assessments for these chemicals to be directly benchmarked with pesticides. It is anticipated that partnerships with scientists and policy makers in EPA's Office of Water and within OPPTS will be necessary to directly apply the results of this research into EPA policy on pharmaceutical and personal care products.

The ultimate benefit of this research will be to provide extensive environmental fate, ecotoxicity, and occurrence information on a class of chemicals for which little data is published in the literature, but that have the potential to be present in water bodies including drinking water sources receiving treated wastewater effluent. Pesticide regulatory studies are a good benchmark to base aquatic risk assessments. This information should allow environmental risk assessments to be conducted for these compounds and could be a model by which pharmaceutical manufacturers could begin to assess their products as they are commercialized. This work may also indicate that these compounds will degrade quickly in the environment and be of no cause for concern, or it may indicate that most pharmaceuticals should be tested for environmental and ecological safety with the same rigor as pesticides.